THAT WHICH IS CLAIMED IS:

1. A method of performing a Grover's or a Deutsch-Jozsa's quantum algorithm using a certain binary function (f) defined on a space having a basis of vectors of n qubits, comprising carrying out a superposition operation over input vectors for generating components of linear superposition vectors referred on a second basis of vectors of n+1 qubits, an entanglement operation over components of said linear superposition vectors for generating components of numeric entanglement vectors, and an interference operation over components of said numeric entanglement vectors for generating components of output vectors, characterized in that said entanglement operation is carried out by:

generating, for components of each superposition vector, corresponding components of a numeric entanglement vector (d1, ..., d8), each component referred to a respective vector of the second basis being

equal to the corresponding component of the respective superposition vector, if said binary function (f) is null in correspondence of the vector of the first basis constituted by the first n qubits of said respective vector of the second basis, or

the opposite of the corresponding component of the respective superposition vector, if said binary function (f) is non null in correspondence of the vector of the first basis constituted by the first n qubits of said respective vector of the second basis.

2. The method of claim 1, wherein said

components are the even components of vectors, and the odd components of each output vectors are obtained inverting its even components.

3. The method of claim 1, wherein said components are the odd components of vectors, and the even components of each output vectors are obtained inverting its odd components.

4. The method of claim 1, wherein said even or odd components of a numeric entanglement vector (d1, ..., d8) are obtained carrying out the following operations:

encoding components of each linear superposition vector (y_i^*) with a low logic value if negative and with a high logic value if positive, generating components of encoded superposition vectors (y_i);

generating, for components of each encoded superposition vector (y_i), corresponding components of an encoded entanglement vector (g_i), each component referred to a respective vector of the second basis being obtained by

copying the corresponding component of the respective encoded superposition vector (y_i), if said binary function (f) is null in correspondence of the vector of the first basis constituted by the first n qubits of said respective vector of the second basis, or

logically inverting the corresponding component of the respective encoded superposition vector (y_i), if said binary function (f) is non null in

correspondence of the vector of the first basis constituted by the first n qubits of said respective vector of the second basis;

decoding the components of encoded entanglement vectors (g_i) generating said components of numeric entanglement vectors (d1, ..., d8).

5. The method of claim 4, wherein each of said components of encoded entanglement vector (g_i) is obtained by XORing the corresponding component of the encoded superposition vector (y_i) with the value of said function in correspondence of said vector of the first basis constituted by said first n qubits.

6. The method of claim 1 of performing a Grover's quantum algorithm, wherein said interference operation comprises the following operations:

calculating a weighed sum with a scale factor ($1/2^{n-1}$) of the even or the odd components of a numeric entanglement vector (d1, ..., d8);

generating, respectively, each even or odd component of an output vector (i1, ..., i8) subtracting a corresponding even or odd component of a numeric entanglement vector (d1, ..., d8) from said weighed sum (s1, s2).

7. A quantum gate for running a Grover's or a Deutsch-Jozsa's quantum algorithm using a certain binary function (f) defined on a space having a basis of vectors of n qubits, composed of a superposition subsystem carrying out a superposition operation over components of input vectors for generating components

of linear superposition vectors referred on a second basis of vectors of $n+1$ qubits, an entanglement subsystem carrying out an entanglement operation over components of said linear superposition vectors for generating components of numeric entanglement vectors, and an interference subsystem carrying out an interference operation over components of said numeric entanglement vectors for generating components of output vectors, said entanglement subsystem comprising

a command circuit generating a number (2^n) of logic command signals encoding the values of said binary function (f) in correspondence of the vectors of the first basis;

circuit means, input with said logic command signals, generating, for components of each superposition vector, corresponding signals representing components of a numeric entanglement vector (d1, ..., d8), each component referred to a respective vector of the second basis being

equal to the corresponding component of the respective superposition vector, if said binary function (f) is null in correspondence of the vector of the first basis constituted by the first n qubits of said respective vector of the second basis, or

the opposite of the corresponding component of the respective superposition vector, if said binary function (f) is non null in correspondence of the vector of the first basis constituted by the first n qubits of said respective vector of the second basis.

8. The quantum gate of claim 7, wherein said circuit means encode components of each linear

superposition vector (y_i^*) with a low logic value if negative and with a high logic value if positive, generating signals representing components of an encoded superposition vector (y_i), and comprise

an array of XOR logic gates each input with a signal representing a component of an encoded superposition vector (y_i) and with a relative logic command signal, generating voltage signals representing components of encoded entanglement vectors (g_i);

an array of the same number of digital/analog converters that decodes components of the encoded entanglement vectors, generating signals representing corresponding components of numeric entanglement vectors (d1, ..., d8).

9. The quantum gate of claim 8, wherein each digital/analog converter is an adder that outputs a signal representing the weighed difference with a second scale factor between said component of encoded entanglement vectors (g_i) and a reference value (V26, ..., V33).

10. The quantum gate of claim 7 for running a Grover's quantum algorithm, wherein said interference subsystem comprises

an adder input with voltage signals representing even or odd components of a numeric entanglement vector (d1, ..., d8) and generating a sum signal (s1, s2) representing a weighed sum with a scale factor ($1/2^{n-1}$) of said even or odd components;

an array of adders each being input with a

respective signal representing an even or odd component, respectively, of a numeric entanglement vector (d1, ..., d8) and with said sum signal (s1, s2), generating a signal representing an even or odd component, respectively, of output vector (i1, ..., i8) as the difference between said sum signal (s1, s2) and said signal representing an even or odd component of a numeric entanglement vector (d1, ..., d8).